Ray-4(studies of university nearby areas)

SYNOPSIS

Enviroeconomic Synthesis of Nanoparticles Using spices and different plant extract

PLANT EXTRACT- DHATURA (DHATURA STRAMONIUM L),TULSI(OCIMUM SANCTUM)
SPICES-CURRY LEAF (MURRAYA KOENIGII),GINGER(ZINGIBER OFFICINALE)

''बेटी बचाओ, बेटी पढ़ाओ''

Submitted in
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Of
Doctor of Philosophy
(Chemistry)

Submitted to
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Objective -

1. The major objective of this work is to synthesis biofunctionalized noble metal nanoparticles using biological routes having application as actimicrobial and articancer agent.
2. To establish a structure property correlation for better understanding.
3. To use the synthesized nanoparticles as a versatile catalysts because of more efficient reactivity and selectivity.
4. Direction for future research work in the area in future.

Problem -

1. The main difficulty lies in their preparation and preservation of Cu nanoparticles as they oxidized immediately when exposed in

air to overcome this oxidation problem intert media such as Argon, Nitrogen, some protecting agents are used.

2. It was found that high doses of silver when administered intravenously could cause convulsions and even death.

Introduction -

During the recent decades, vigorous research, on metal nanoparticles has been developed speedily because of their excellent optical, electrical, anti-microbial, catalytic, magnetic and other chemical and physical properties. Nobel metals are widely used in photonics [1] [2], micro-electronics [3] [4], photo-catalytic [5][6], and antimicrobial activities [7], [8], [9] [10]. There are many means available for metal nanoparticles synthesis, low cost, non-toxic, high yield and environmental friendly procedure are required to develop metal nanoparticles. Metallic nanoparticles are mostly prepared from nobel metal ions such as Gold, Silver, Platinum and Lead by economic, eco-friendly simple route of green / biosynthesis of plant extract methods. Datura metel L.. (Karoo omatay-Tamil) plant helps in the treatment of swelling to the bite of vipers and poisonous insects. The whole plant but especially the leaves and seed, have anaesthetic, hallucinogenic, antiasthmatic, antipasodic, antitussive,

bronchodilator, anodyne, hypnotic and mydriatic effects. [11] Indian greeneries are the chief and cheap source of medicinal plants and plant products. From centuries till date, these medicinal plants have been extensively utilized in Ayurveda, Recently, many such plants have been gaining importance due to their unique constituents and their versatile applicability in various developing fields of research and development. Existing literature also reports successful synthesis of silver nanoparticles through a green route where the reducing and capping agent selected was the later obtained from Tatropha Curcas [12]AgNPs were also obtained using Aloe vera [13], as well as various other plant extracts [14] as reducing agent. Conventionally, nanometerials are synthesized using either chemical or physical methods which include sol process, micelle, chemical precipitation, hydrothermal method, pyrolysis, and chemical vapour deposition [15]

Review of Literature

M.Gomathi, P.V. Rajkumar & others (2016)

Silver nanoparticles of 15-20nm size with the spherical shape were synthesized from green synthesis method using Datura Straonium leaf extract synthesized Ag NPs were studied for their optical, structural surface, morphological and antibacterial properties. By FTIR analysis exhibits the possible reducing biomolecules with in the leaf extract. The synthesized Ag NPs showed antibacterial activity against E-coli and S.aureus bacteria.

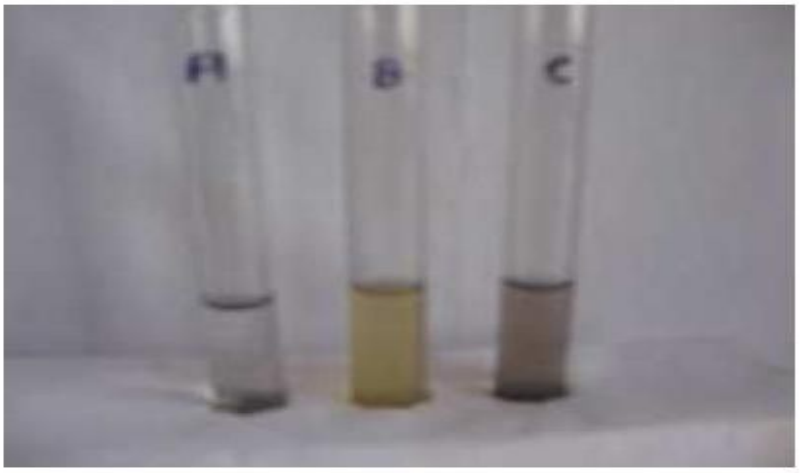

Fig.1 a)Dhatura silver nanoparticle SPR at 410 nm, b)Tube A- silver nitrate, Tube B- Extract, Tube C- Dhatura silvernanoparticle solution.

Kamaraj Banupriya and Karuppiah Muthu (2016) reported that green synthesis of silver Nanoparticles (Ag NPs) was performed from aqueous silver nitrate using the reducing agents of Datura metal, leaves extract partition aqueous fraction. The change of color from colorless to dark brown was visually identifying the formation of Ag NPs. They reported the phytochemical functional groups to the

capping the NPs by FTIR spectrum. The mean sizes of nanoparticles were calculated by Debye-Schreer equation.

Priya Banerjee, & other (2013) scientist reported that seeds treated with Ag NP solutions exhibited (Moong Been) - (Vigna radiata) better rates of germination and oxidative stress enzyme activity nearing control levels. Charusheela Ramteke, Tapan Chakrobarti & other (2012) scientist reported that the synthesis of anti bacterial herb, Ocimum sanctum (Tulsi). FTIR analysis revealed that the Ag NPs were stabilized by eugenols, terpens and other aromatic compounds present in the extract such Ag NPs stabilized by Tulsi leaf extract were found to have enhanced antimicrobial activity against well known pathogenic strains, namely staphylococcus aureus and E.coli.

Materials and Methods -

a) Preparation of the plant leaf extract -

We will try to synthesis the nanoparticles from the leaf extract of plants like Datura (Datura stramonium leaf extract and metel leaf) (Tulsi) Ocimum sanctum, Catharanthus, Cinnamon Zeylanicum (dalchini), murraya Koenigii (curry leaf) Zingiber officianle (ginger) Linu usitatissimum flaxseed, etc and will study their antibacterial, anticancer property.

For the preparation of nanoparticles the leaves of above plants will be taken one by one leaves will be washed with distilled water. The leaves will be cut into fine pieces and crushed with 60ml of sterile distilled water using motor and pestle. The contents will be boiled

with constant stirring for 15-20 minutes. After cooling contents will be filtered with whatman no.1 filter paper. Dark yellowish brown colored extracts will be obtained which used as reducing agent and stabilizer.

b) Synthesis of Nanoparticles -

Here is possibility the formation of different kind of nanoparticles like silver nanoparticles, Au, Fe & Cu nanoparticles for the preparation of nanoparticles one by one firstly we will apply silver nitrate solution on all the leaf extract of plants taken. For this 150 ml of 0.1 m silver nitrate solution will be prepared, 15 ml of Datura leaf extract, 15 ml of tulsi leaf extract, 15 ml of Catharants leaf extract, 15 ml of curry leaf, 15 ml of dalcheeni extract, 15 ml of ginger extract will be taken and 10 mol of silver nitrate solution will be mixed into it. And will put the mixture on the magnetic stirrer at 60-70℃ for 20 minutes. If within 10-15 min. the color of the solution changed to dark brown from yellow, that mean reduction of Ag ions has taken place and the ensure that formation of Ag NPs takes place.

Then we apply precursor $CuSO_4$, $HAuCl_4$, $FeSO_4$ find the formation of cu nanoparticles, Au NPs and Fe nanoparticles on all the leaf extract taken.

The synthesized NPs will be characterized by UV-visible (Vis.) spectrophotometer, particle size analyse (DLS), scanning electron microscopy (SEM), transmission electron microscopy (TEM) and Fourier Transform Infrared Spectrometer (FTIR) analysis will be

carried out to determine the nature of the capping agents in each of these leaf extract. In further we will discuss the anti-cancer, antibacterial properties of these sample leaves.

To get even better result we will try to change our material and methods and will try to apply better techniques.

Result and Discussion -

The reduction of silver ion into silver nanoparticles when added to plant extracts lead to color change silver nanoparticles exhibited dark brown color in aquous solution. Leaf extract without $AgNO_3$ solution does not show any color changes. If the color of the solution changes from blue to pale yellow after adding the leaf extract of plants, then the formation of cu nanoparticles takes place.

To formation of Fe NPs we will apply ferric chloride precursor with sodium borohydride as the reducing agent.

The reduction of gold ions into gold particles during exposure to the plant and spices extract is followed by colour change from yellow to different color and change in P^H of auric acid, extract and gold nanoparticle solution, depends on the plant and spices extract, It is well known that auric acid exhibit yellowish colors in distilled water. As the plant extract was mixed in the aqueous solution of the gold ion complex, it started to change the colour from yellowish to various different colors due to reduction of gold ion.

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